

## ARACHNIDS

### **Spruce-fir moss spider: Critical Habitat Designation**

Critical Habitat Description: The critical habitat for this species is defined as all portions of the Pisgah National Forest in North Carolina and the Cherokee National Forest in Tennessee, bounded to the north and to the south of the North Carolina/Tennessee state line by the 5,400-foot contour, from the intersection of the 5,400-foot contour with the State line north of Elk Hollow Branch, Avery County, North Carolina, and southwest of Yellow Mountain, Carter County, Tennessee, west to the 5,400-foot contour at Eagle Cliff, Mitchell County, North Carolina. Within these areas, the primary constituent elements include (1) Fraser fir or fir-dominated spruce-fir forests at and above 5,400 feet mean sea level, and (2) moderately thick and humid, but not wet, moss (species in the genus *Dicranodontium*, and possibly *Polytrichum*) and/or liverwort mats on rock surfaces that are adequately sheltered from the sun and rain (by overhang and aspect) and include a thin layer of humid soil and/or humus between the moss and rock surface.

Critical Habitat Biological Conclusion:

[USFWS] United States Fish and Wildlife Service. 2001. Designation of Critical Habitat for the Spruce-fir Moss Spider. 66 FR 35547 35566.

### **Spruce-fir moss spider**

USFWS Recommended Survey Window: May-August

Habitat Description: This species is known only from spruce-fir forests in the Appalachian mountains of North Carolina and Tennessee. The spruce-fir moss spider occurs in well-drained moss and liverwort mats growing on rocks or boulders. These mats are found in well-shaded areas in mature, high elevation ( $\geq 5,000$  feet mean sea level) Fraser fir and red spruce forests. The spruce-fir moss spider is very sensitive to desiccation and requires environments of high and constant humidity. The need for humidity relates to the moss mats, which cannot become too parched or else the mats become dry and loose. Likewise, the moss mats cannot be too wet because large drops of water can also pose a threat to the spider. The spider constructs its tube-shaped webs in the interface between the moss mat and the rock surface. Some webs have been found to extend into the interior of the moss mat.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 18, 2010).

[USFWS] United States Fish and Wildlife Service. Spruce-fir Moss Spider in North Carolina. <http://www.fws.gov/nc-es/spider/sprummoss.html>. (Accessed: October 18, 2010).

[USFWS] Spruce-fir moss spider fact sheet. <http://www.fws.gov/asheville/pdfs/Spruce%20Fir%20Moss%20Spider.pdf>. (Accessed: October 18, 2010).

## **BIRDS**

### **Piping plover: Critical Habitat Designation**

**Critical Habitat Description:** *There are too many individual units of critical habitat designated by USFWS to list here. See the Federal Register (cited below) for a description of each designated unit. Note: Units 1, 2, 4, and 5 (including portions of Dare and Hyde Counties) of the designated Critical Habitat were vacated by court order and remanded to the USFWS. Thus, these units no longer exist. Tailor the critical habitat description for this species to the unit(s) closest to the project.*

Primary constituent elements of wintering piping plover habitat include sand and/or mud flats with no or very sparse emergent vegetation. In some cases, these flats may be covered or partially covered by a mat of blue-green algae. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also essential, especially for roosting piping plovers. Such sites may have debris, detritus (decaying organic matter), or micro-topographic relief (less than 20 inches above substrate surface) offering refuge from high winds and cold weather. Essential components of the beach/dune ecosystem include surf-cast algae for feeding of prey, sparsely vegetated back beach (beach area above mean high tide seaward of the dune line, or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road) for roosting and refuge during storms, spits (a small point of land, especially sand, running into water) for feeding and roosting, salterns (bare sand flats in the center of mangrove ecosystems that are found above mean high water and are only irregularly flushed with sea water) and washover areas for feeding and roosting. Washover areas are broad, unvegetated zones with little or no topographic relief that are formed and maintained by the action of hurricanes, storm surge, or other extreme wave action. Several of these components (sparse vegetation, little or no topographic relief) are mimicked in artificial habitat types used less commonly by piping plovers, but that are considered critical habitat (*e.g.*, dredge spoil sites).

Critical Habitat Biological Conclusion:

[USFWS] United States Fish and Wildlife Service. 2001. Final Determination of Critical Habitat for Wintering Piping Plovers. 66 FR 36038-36136.

## **Piping plover**

USFWS Recommended Survey Window: year round

Habitat Description: The piping plover breeds along the entire eastern coast of the United States. North Carolina is uniquely positioned in the species' range, being the only State where the piping plover's breeding and wintering ranges overlap and the birds are present year-round. They nest most commonly where there is little or no vegetation, but some may nest in stands of beach grass. The nest is a shallow depression in the sand that is usually lined with shell fragments and light-colored pebbles.

### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 18, 2010).

[USFWS] United States Fish and Wildlife Service. Piping plover (*Charadrius melodus*) Species Profile. <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B079>. (Accessed: October 18, 2010).

## **Red-cockaded woodpecker**

USFWS Recommended Survey Window: year round; November-early March (optimal)

Habitat Description: The red-cockaded woodpecker (RCW) typically occupies open, mature stands of southern pines, particularly longleaf pine (*Pinus palustris*), for foraging and nesting/roosting habitat. The RCW excavates cavities for nesting and roosting in living pine trees, aged 60 years or older, which are contiguous with pine stands at least 30 years of age to provide foraging habitat. The foraging range of the RCW is normally no more than 0.5 miles.

### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 18, 2010).

[USFWS] United States Fish and Wildlife Service. Red-cockaded Woodpecker (*Picoides borealis*). <http://www.fws.gov/rcwrecovery/rcw.html>. (Accessed: October 18, 2010).

### **Roseate tern**

USFWS Recommended Survey Window: June-August

Habitat Description: In North Carolina, the roseate tern is most likely to be seen on a barrier island as it passes through the area to and from northern breeding grounds. March through May and August through October are the most likely times to see these birds. Although sight records of this species exist for June, July, and August, these are likely non-breeding males. Only one nesting record for this species has been documented for the state within the past twenty years. However, if this species expands its range it is likely to choose coastal areas of the state for nesting. The roseate tern nests on isolated, less disturbed coastal islands in areas characterized by sandy, rocky, or clayey substrates with either sparse or thick vegetation. Eggs are usually laid such that grasses or overhanging objects provide shelter. They may also nest in marshes, but it is an uncommon occurrence.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 18, 2010).

[USFWS] United States Fish and Wildlife Service. Roseate Tern (*Sterna dougallii dougallii*) Species Profile. <http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=B07O>. (Accessed: October 18, 2010).

### **Rufa Red Knot: Critical Habitat Designation**

Critical Habitat Description: *As of late 2014, USFWS was reviewing a critical habitat designation for the red knot.*

### **Rufa Red Knot**

USFWS Recommended Survey Window: TBD

Habitat Description: The rufa red knot is one of the six recognized subspecies of red knots, and is the only subspecies that routinely travels along the Atlantic coast of the United States during spring and fall migrations. It is known to winter in North Carolina and to stop over during migration. Habitats used by red knots in migration and wintering areas are similar in character: coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In North America, red knots are commonly found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks. Ephemeral features such as sand spits, islets, shoals, and sandbars, often associated with inlets can be important habitat for roosting.

## Biological Conclusion:

[USFWS] Rufa Red Knot Ecology and Abundance, Supplement to: Endangered and Threatened Wildlife and Plants; Proposed Threatened Status for the Rufa Red Knot (*Calidris canutus rufa*)  
[http://www.fws.gov/northeast/redknot/pdf/20130923\\_REKN\\_PL\\_Supplement02\\_Ecology%20Abundance\\_Final.pdf](http://www.fws.gov/northeast/redknot/pdf/20130923_REKN_PL_Supplement02_Ecology%20Abundance_Final.pdf). (Accessed: February 23, 2015.)

## Wood stork

USFWS Recommended Survey Window: June-September

Habitat Description: Wood storks are known to occur in several coastal North Carolina counties, and records indicate that they have been breeding in North Carolina since 2005. Wood storks typically construct their nests in medium to tall trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water. In many areas, bald cypress and red mangrove trees are preferred. During the nonbreeding season or while foraging, wood storks occur in a wide variety of wetland habitats, including freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. Because of their specialized feeding behavior, the most attractive feeding areas are swamp or marsh depressions where fish become concentrated during dry periods.

## Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 18, 2010).

[USFWS] United States Fish and Wildlife Service. Wood stork (*Mycteria americana*) Species Profile.  
<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06O>. (Accessed: October 19, 2010).

## FISH

### Atlantic sturgeon: Critical Habitat Designation

Critical Habitat Description: *NMFS will propose critical habitat by Nov. 30, 2015, and publish final rules a year after that.*

### **Atlantic sturgeon**

USFWS/NMFS Recommended Survey Window: surveys not required; assume presence in appropriate waters

Habitat Description: The Atlantic sturgeon is a large fish that occurs in major river systems along the eastern seaboard of the United States. It is an anadromous species that migrates to moderately-moving freshwater areas to spawn in the spring; in some southern rivers a fall spawning migration may also occur. Spawning occurs in moderately flowing water in deep parts of large rivers, usually on hard surfaces (e.g., cobble). Juveniles usually reside in estuarine waters. Subadults and adults live in coastal waters and estuaries when not spawning, generally in shallow nearshore areas dominated by gravel and sand substrates.

Biological Conclusion:

[NMFS] Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*).

<http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm>. (Accessed: February 23, 2015.)

### **Cape Fear shiner: Critical Habitat Designation**

Critical Habitat Description: For the Cape Fear Shiner, designated critical habitat areas are defined as:

1. Chatham County, NC. Approximately 4.1 miles of the Rocky River from North Carolina State Highway 902 Bridge downstream to Chatham County Road 1010 Bridge;
2. Chatham and Lee Counties, NC. Approximately 0.5 river mile of Bear Creek, from Chatham County Road 2156 Bridge downstream to the Rocky River, then downstream in the Rocky River (approximately 4.2 river miles) to the Deep River, then downstream in the Deep River (approximately 2.6 river miles) to a point 0.3 river mile below the Moncure, North Carolina, U.S. Geological Survey Gaging Station; and,
3. Randolph and Moore Counties, NC. Approximately 1.5 miles of Fork Creek, from a point 0.1 river mile upstream of Randolph County Road 2873 Bridge downstream to the Deep River then downstream approximately 4.1 river miles of the Deep River in Randolph and Moore Counties, North Carolina, to a point 2.5 river miles below Moore County Road 1456 Bridge.

Primary constituent elements are physical and biological features of the designated critical habitat essential to the conservation of the species. Primary constituent elements are physical and biological features of the designated critical

habitat essential to the conservation of the species. The constituent elements for the Cape Fear shiner include: clean streams with gravel, cobble, and boulder substrates with pools, riffles, shallow runs; slack water areas with large rock outcrops; and side channels and pools with water of good quality and relatively low silt loads.

Critical Habitat Biological Conclusion:

[USFWS] United States Fish and Wildlife Service. Cape Fear shiner (*Notropis mekistocholas*). <http://www.fws.gov/nc-es/fish/cfshiner.html>. (Accessed: February 21, 2008).

[USFWS] United States Fish and Wildlife Service. 1987. Determination of Endangered Species Status and Designation of Critical Habitat for Cape Fear Shiner. 52 FR 36034-36039.

**Cape Fear shiner**

USFWS Recommended Survey Window: April-June (tributaries); year round (large rivers)

Habitat Description: The Cape Fear shiner is known only from the Cape Fear River watershed. In general, habitat occurs in streams with clean gravel, cobble, or boulder substrates. It is most often observed inhabiting slow pools, riffles, and slow runs associated with water willow (*Justicia americana*) beds, which it uses for cover. Juveniles can be found inhabiting slackwater, among large rock outcrops and in flooded side channels and pools. Spawning occurs May through June, when water temperatures reach 66 degrees Fahrenheit.

Biological Conclusion:

[NCNHP] North Carolina Natural Heritage Program. Cape Fear shiner (*Notropis mekistocholas*). [http://www.ncwildlife.org/Wildlife\\_Species\\_Con/WSC\\_EndFish\\_1.htm](http://www.ncwildlife.org/Wildlife_Species_Con/WSC_EndFish_1.htm). (Accessed: October 18, 2010).

[NCWRC] North Carolina Wildlife Resources Commission. Cape Fear shiner (*Notropis mekistocholas*). [http://www.ncwildlife.org/pg07\\_WildlifeSpeciesCon/pg7b1b1\\_1.htm](http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7b1b1_1.htm). (Accessed: February 18, 2008)

[USFWS] United States Fish and Wildlife Service. Cape Fear Shiner. [http://www.fws.gov/nc-es/fish/CFS\\_Fact\\_Sheet1.pdf](http://www.fws.gov/nc-es/fish/CFS_Fact_Sheet1.pdf). (Accessed: October 18, 2010).

[USFWS] United States Fish and Wildlife Service. Cape Fear shiner (*Notropis mekistocholas*). <http://www.fws.gov/nc-es/fish/cfshiner.html>. (Accessed: October 18, 2010).

## **Roanoke logperch**

USFWS Recommended Survey Window: year round; April – June (optimal)

Habitat Description: In North Carolina, the logperch is known from the upper Roanoke River basin. The fish typically inhabits warm, usually clear, small to medium-sized rivers. These waterways have a moderate to low gradient, and the fish usually inhabit riffles and runs, with silt-free sandy to boulder-strewn bottoms. Young are usually found in slow runs and pools with clean sandy bottoms. In winter, logperch may be more tolerant of silty substrates, and may also inhabit pools. Spawning occurs in April or May in deep runs over gravel and small cobble. Males are associated with shallow riffles during the reproductive period; females are common in deep runs over gravel and small cobble, where they spawn. The upper Roanoke River population is threatened by urbanization, industrial development, water supply and flood control projects, and agricultural runoff in the upper basin.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 18, 2010).

[USFWS] United States Fish and Wildlife Service. Roanoke Logperch (*Percina rex*) [http://www.fws.gov/northeast/virginiafield/pdf/endspecies/fact\\_sheets/roanoke%20logperch.pdf](http://www.fws.gov/northeast/virginiafield/pdf/endspecies/fact_sheets/roanoke%20logperch.pdf). (Accessed: October 18, 2010).

[USFWS] United States Fish and Wildlife Service. 1991. Roanoke logperch (PERCINA REX) recovery plan. Agency draft. U.S. Fish and Wildl. Serv., Newton Corner, Massachusetts. 31 pp.

## **Shortnose sturgeon**

USFWS/NMFS Recommended Survey Window: surveys not required; assume presence in appropriate waters

Habitat Description: Shortnose sturgeon occur in most major river systems along the eastern seaboard of the United States. The species prefers the near shore marine, estuarine, and riverine habitat of large river systems. It is an anadromous species that migrates to faster-moving freshwater areas to spawn in the spring, but spends most of its life within close proximity of the river's mouth. Large freshwater rivers that are unobstructed by dams or pollutants are imperative to successful reproduction. Distribution information by river/waterbody is lacking for the rivers of North Carolina; however, records are known from most coastal counties.

Biological Conclusion:

[NMFS] National Marine Fisheries Service. 1998. Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 104 pages.

[NOAA] National Oceanic and Atmospheric Administration. Fisheries, Office of Protected Resources. Shortnose sturgeon (*Acipenser brevirostrum*) <http://www.nmfs.noaa.gov/pr/species/fish/shortnosesturgeon.htm>. (Accessed: February 15, 2008).

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 19, 2010).

### **Spotfin chub (=turquoise shiner): Critical Habitat Designation**

Critical Habitat Description: In North Carolina, Macon and Swain Counties, critical habitat is designated as the Little Tennessee River, main channel from the backwaters of Fontana Lake upstream to the North Carolina-Georgia state line.

Critical Habitat Biological Conclusion:

[USFWS] United States Fish and Wildlife Service. 1977. Final Threatened Status and Critical Habitat for Five Species of Southeastern Fishes. 42 FR 47840-47845.

### **Spotfin chub (= turquoise shiner)**

USFWS Recommended Survey Window: September – November (tributaries); year round (large rivers)

Habitat Description: The spotfin chub occurs in the Little Tennessee River drainage system. This minnow typically inhabits moderate to large streams, 49-230 feet in width. However, they have been documented utilizing smaller tributaries in the fall. These streams should have a good current, clear water, cool to warm temperatures, and pools alternating with riffles. Specimens of spotfin chub have been taken from a variety of substrates but rarely from significantly silted substrates. This species has been observed spawning under loose rocks over bedrock.

Biological Conclusion:

[NCWRC] North Carolina Wildlife Resources Commission. Spotfin Chub (*Cyprinella monacha*). [http://www.ncwildlife.org/pg07\\_WildlifeSpeciesCon/pg7b1b1\\_2.htm](http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7b1b1_2.htm). (Accessed: October 19, 2010).

[USFWS] United States Fish and Wildlife Service. Spotfin Chub. 2008. [http://www.fws.gov/asheville/htmls/listedspecies/spotfin\\_chub.html](http://www.fws.gov/asheville/htmls/listedspecies/spotfin_chub.html). (Accessed: October 19, 2010).

**Waccamaw silverside (= skipjack or glass minnow)**

USFWS Recommended Survey Window: year round

Habitat Description: The Waccamaw silverside is found only in the Waccamaw River watershed. The required habitat for the Waccamaw silverside to survive is high quality, neutral pH water with a clean sandy substrate. Waccamaw silversides inhabit the surface over shallow, dark bottomed areas. Spawning occurs in April through June and peaks when water temperatures reach 68-72 degrees Fahrenheit.

Biological Conclusion:

[NCWRC] North Carolina Wildlife Resources Commission. Waccamaw Silverside (*Menidia extensa*). [http://www.ncwildlife.org/pg07\\_WildlifeSpeciesCon/pg7b1b1\\_3.htm](http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7b1b1_3.htm). (Accessed: October 19, 2010).

[USFWS] United States Fish and Wildlife Service. Waccamaw Silverside in North Carolina. <http://www.fws.gov/nc-es/fish/waccsilver.html>. (Accessed: October 19, 2010).

## **INSECTS**

**Saint Francis' satyr**

USFWS Recommended Survey Window: May 5-June 6 and July 26-August 21

Habitat Description: The Saint Francis' satyr butterfly is only known from the Sandhills of North Carolina, although its historic range may have been much larger. This butterfly is known to inhabit wide, wet meadows dominated by sedges and other wetland graminoids. These wetlands are often relicts of beaver activity and are boggy areas that are acidic and ephemeral. These sites must be continually maintained to persist as open areas. The larval host of the Saint Francis' satyr is thought to be grasses, sedges and rushes.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 19, 2010).

[USFWS] United States Fish and Wildlife Service. Saint Francis Satyr in North Carolina. <http://www.fws.gov/nc-es/insect/stfrancis.html>. (Accessed: October 19, 2010).

[USFWS] United States Fish and Wildlife Service. 1996. Saint Francis' Satyr Recovery Plan. Atlanta, GA. 27 pp.

[DOA] Department of the Army, Endangered Species Branch. 2010. St. Francis' Satyr Monitoring and Studies. <http://www.bragg.army.mil/esb/SFSMgmt.htm>. (Accessed: October 19, 2010).

## **MAMMALS**

### **Carolina northern flying squirrel**

USFWS Recommended Survey Window: May -October; coldest days in coldest winter months (nest box surveys)

Habitat Description: There are several isolated populations of the Carolina northern flying squirrel in the mountains of North Carolina. This nocturnal squirrel prefers the ecotone between coniferous (red spruce, Fraser fir, or hemlock) and mature northern hardwood forests (beech, yellow birch, maple, hemlock, red oak, and buckeye), typically at elevations above 4,500 feet mean sea level. In some instances, the squirrels may be found on narrow, north-facing valleys above 4,000 feet mean sea level. Both forest types are used to search for food and the hardwood forest is used for nesting sites. Mature forests with a thick evergreen understory and numerous snags are most preferable. In winter, squirrels inhabit tree cavities in older hardwoods, particularly yellow birch.

### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 19, 2010).

[NCWRC] North Carolina Wildlife Resources Commission. 2005. Northern Flying Squirrel Fact Sheet. [http://www.ncwildlife.org/pg07\\_WildlifeSpeciesCon/nongame\\_noflysqirrel\\_lores.pdf](http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/nongame_noflysqirrel_lores.pdf). (Accessed: February 18, 2008).

[USFWS] United States Fish and Wildlife Service. Carolina northern flying squirrel. [http://www.fws.gov/asheville/htmls/listedspecies/Carolina\\_northern\\_flying\\_squirrel.html](http://www.fws.gov/asheville/htmls/listedspecies/Carolina_northern_flying_squirrel.html) (Accessed: October 19, 2010).

## **Gray bat**

USFWS Recommended Survey Window: May 15-August 15 (summer); January 15-February 15 (winter)

Habitat Description: Gray bats are known mainly from the cave regions of the Southeast and Midwest. They live in colonies in caves, utilizing different caves for summer roosting and winter hibernating. Summer caves are usually within one half mile of a river or reservoir, which provides foraging habitat. During the summer, females give birth and rear the young in maternity caves, while males and yearlings roost in separate bachelor caves. Caves preferred for hibernation are typically deep, vertical caves with a temperature between 42 and 52 degrees Fahrenheit. Gray bats are highly selective in choosing suitable caves, and nine known caves are thought to provide hibernation space for 95 percent of the population. Migration from summer to winter caves begins in September and is mainly complete by the beginning of November.

### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 19, 2010).

[USFWS] United States Fish and Wildlife Service. Gray Bat in North Carolina. <http://www.fws.gov/nc-es/mammal/graybat.html>. (Accessed: October 19, 2010).

## **Indiana bat**

USFWS Recommended Survey Window: May 15-August 15 (summer); January 15-February 15 (winter)

Habitat Description: The range of the Indiana bat centers on cavernous limestone regions in the eastern United States. The Indiana bat has different summer and winter habitat requirements. Winter habitat is in caves and abandoned mines that usually have standing water on the floor. The bats migrate to the winter habitat between September and November; they stay there with occasional periods of activity until they emerge in mid-March to early May. Hibernation only occurs in regions where winter temperatures are stable and around 40 degrees Fahrenheit. Suitable summer habitat includes roosting, foraging, and commuting areas. Summer roosting habitat includes forests and woodlots containing potential roost trees, which have exfoliating bark, cracks, or crevices in trees (alive or dying) or snags that are > 3 inches diameter-at-breast height (dbh). Roosting habitat may contain dense or loose aggregates of trees with variable amounts of canopy closure. (While any tree greater than 3" dbh has the potential to be Indiana bat summer roosting habitat, solid stands of 3" dbh and smaller trees are not considered suitable roosting habitat; suitable roosting habitat would generally consist of

forest patches with larger trees also present.) Bridges are occasionally used for roosting by Indiana bats in the summer.

Foraging habitat consists of forested patches, wooded riparian corridors, and natural vegetation adjacent to these areas. Commuting habitat includes wooded tracts, tree-lines, wooded hedgerows, streams or other such pathways that are within or connected to roosting or foraging areas. Streams that have been stripped of their riparian vegetation do not appear to offer suitable foraging habitat. Rivers as foraging areas and as migration routes are extremely important to this species.

#### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: February 16, 2012).

[USFWS] Rangewide Indiana Bat Summer Survey Guidance, Draft. February 3, 2012. <http://www.fws.gov/midwest/Endangered/mammals/inba/DraftINBASurveyGuidanceFeb2012.html>.

[USFWS] United States Fish and Wildlife Service. 2005. The Indiana Bat in Western North Carolina: A Status Summary Update-April 2005. <http://www.fws.gov/nc-es/mammal/Aprilbat.pdf>. (Accessed: October 19, 2010).

[USFWS] United States Fish and Wildlife Service. Indiana bat in North Carolina. <http://www.fws.gov/nc-es/mammal/indianabat.html>. (Accessed: October 19, 2010).

*Do not include the following in an NRTR. Adding it here for informational purposes only:*

#### NOTES for the reviewer:

1. NHP records need to be checked at least 10 miles out from the project. Bats will travel several miles in a night just to forage.
2. Although caves and old mines are essentially only a concern for counties with winter occurrences of I-bats, *any time a cave or mine is going to be affected in a project, it should be mentioned in the NRTR.* (Gray bats and Virginia big-eared bats only roost in caves, mines and potentially bridges.)
3. *Bridges always need to be checked for evidence of roosting bats* for any county that has a federally listed bat species, *unless* the bottom of the bridge is <5ft above the water's surface. Bats won't roost that low as it leaves them vulnerable to predation.
4. Summer counties for Indiana bats (trees and bridges are the primary concern): Cherokee, Clay, Graham, Haywood, Macon and Swain.

5. Winter counties for Indiana bats (bridges, caves and mines are a concern): Graham Jackson, Haywood, Rutherford, Mitchell.
6. In North Carolina, *optimal* I-bat roosting trees are large snags, typically with full sun exposure. The trees are usually dead pines, although other trees, such as dead hemlocks, may be used.

### **Northern long-eared bat**

USFWS Recommended Survey Window: June 1 – August 15

Habitat Description: In North Carolina, the Northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern North Carolina. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically  $\geq 3$  inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

Biological Conclusion:

Natureserve. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. NatureServe, Arlington, VA. <http://explorer.natureserve.org>. (Accessed: September 24, 2014.)

[USFWS] <http://www.fws.gov/midwest/endangered/mammals/nlba/nlbaFactSheet.html>. (Accessed: February 20, 2015.)

[USFWS]. 2014. Northern Long-Eared Bat Interim Conference and Planning Guidance. USFWS Regions 2, 3, 4, 5 & 6. <http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>. (Accessed: February 20, 2015.)

### **Red wolf**

USFWS Recommended Survey Window: year round

Habitat Description: Red wolves were extirpated from North Carolina and most other southeastern states by the 1920's. In the mid 1980's, the United States Fish and

Wildlife Service reintroduced the species to the Alligator National Wildlife Refuge in eastern North Carolina. Since that time, the wolves have expanded their range outside the refuge. Red wolves are generally crepuscular predators, preying on deer, nutria, raccoon, rabbits, and other small mammals. Any area that provides sufficient size, adequate food, water, and the basic cover requirement of heavy vegetation, should be suitable habitat for the red wolf. Telemetry studies indicate that red wolf home range requirements vary from about 25 to 50 square miles.

#### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Red wolves in North Carolina. <http://www.fws.gov/nc-es/mammal/redwolf.html>. (Accessed: October 20, 2010).

#### **Virginia big-eared bat**

USFWS Recommended Survey Window: May 15-August 15 (summer); January 15-February 15 (winter)

Habitat Description: Virginia big-eared bat has been recorded in the Appalachian mountains of North Carolina. They occupy caves in the summer and winter. Hibernating colonies are typically located in deep cave passageways that have stable temperatures and air movement, the temperature in these hibernacula may be lower than that tolerated by other bats. Roost sites are generally located in mines or caves in oak-hickory forests. They will use alternate roost sites but there is no record of long migrations. They are nocturnal and leave their roost to forage on moths, beetles, and other insects. This species feeds mostly over open pasture, corn, and alfalfa fields, and around the crowns of trees.

#### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Virginia big-eared bats in North Carolina. <http://www.fws.gov/nc-es/mammal/vbigear.html>. (Accessed: October 20, 2010).

#### **West Indian manatee**

USFWS Recommended Survey Window: year round

Habitat Description: Manatees have been observed in all the North Carolina coastal counties. Manatees are found in canals, sluggish rivers, estuarine habitats, salt water bays, and as far off shore as 3.7 miles. They utilize freshwater and marine habitats at shallow depths of 5 to 20 feet. In the winter, between October and April, manatees concentrate in areas with warm water. During other times of the year habitats appropriate for the manatee are those with sufficient water depth, an adequate food supply, and in proximity to freshwater. Manatees require a source of freshwater to drink. Manatees are primarily herbivorous, feeding on any aquatic vegetation present, but they may occasionally feed on fish.

#### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. West Indian Manatees in North Carolina. <http://www.fws.gov/nc-es/mammal/manatee.html>. (Accessed: October 20, 2010).

## MUSSELS

### **Appalachian elktoe: Critical Habitat Designation**

Critical Habitat Description: Critical habitat for the Appalachian elktoe has been designated in 144.3 total river miles in six distinct units:

1. Encompasses approximately 24 miles of the main stem of the Little Tennessee River from the Lake Emory Dam in Franklin, Macon County, NC, downstream to the backwaters of Fontana Reservoir in Swain County, NC.
2. Encompasses approximately 26 miles of the main stem of the Tuckasegee River, from NC State Route 1002 bridge in Cullowhee, Jackson County, NC, downstream to the NC 19 bridge north of Bryson City, Swain County, NC.
3. Encompasses approximately 9.1 miles of the main stem of the Cheoah River from the Santeelah Dam downstream to its confluence with the Little Tennessee River, in Graham County, NC.
4. Encompasses approximately 4.7 miles of the main stem of the Little River (French Broad River Basin) from the Cascade Lake Power Plant, downstream to its confluence with the French Broad River in Transylvania County, NC.

5. Encompasses approximately 11.1 miles of the main stem of the West Fork Pigeon River (French Broad River Basin) from the confluence with the Little East Fork Pigeon River downstream to the confluence with the East Fork Pigeon River, and the main stem of the Pigeon River from the confluence of the East Fork Pigeon River and West Fork Pigeon River downstream to the NC 215 crossing, south of Canton, Haywood County, NC.

6. Encompasses approximately 3.7 miles of the main stem of the North Toe River, Yancey and Mitchell counties, NC, from the confluence with Big Crabtree Creek, downstream to the confluence of the South Toe River; approximately 14.1 miles of the main stem of the South Toe River, Yancey County, NC, from the NC State Route 1152 crossing, downstream to its confluence with the North Toe River; approximately 21.6 miles of the main stem of the Toe River, Yancey and Mitchell counties, NC, from the confluence of the North Toe River and South Toe River, downstream to the confluence of the Cane River; approximately 16.5 miles of the main stem of the Cane River, Yancey County, NC, from the NC State Route 1381 crossing, downstream to its confluence with the Toe river; and approximately 13.5 miles of the main stem of the Nolichucky River from the confluence of the Toe River and the Cane River in Yancey County and Mitchell County, NC downstream to the US 23/19W crossing, southwest of Erwin, Unicoi County, TN.

When designating Critical Habitat, the USFWS identifies physical and biological features (primary constituent elements) that are essential to the conservation of the species and that may require special management considerations or protection. The primary constituent elements essential for the conservation of the Appalachian elktoe are:

- 1) Permanent, flowing, cool, clean water;
- 2) Geomorphically stable stream channels and banks;
- 3) Pool, riffle, and run sequences within the channel;
- 4) Stable sand, gravel, cobble, and boulder or bedrock substrates with no more than low amounts of fine sediment;
- 5) Moderate to high stream gradient;
- 6) Periodic natural flooding; and
- 7) Fish hosts, with adequate living, foraging, and spawning areas for them.

Although there are specific sites within the six units that do not contain all of the primary constituent elements, these elements are found consistently throughout the designated river reaches and are present at the sites containing the “healthiest” of the occurrences.

Critical Habitat Biological Conclusion:

[USFWS] United States Fish and Wildlife Service. 2002. Designating Critical Habitat for the Appalachian Elktoe. 67 FR 61016-61040.

### **Appalachian elktoe**

USFWS Recommended Survey Window: year round

Habitat Description: The Appalachian elktoe is known from the French Broad River watershed in North Carolina. The Appalachian elktoe has been observed in moderate- to fast-flowing water, in gravelly substrates often mixed with cobble and boulders, in cracks of bedrock and in relatively silt-free, coarse, sandy substrates. Apparently, stability of the substrate is critical to this species, as it is seldom found in stream reaches with accumulations of silt or shifting sand, gravel, or cobble.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NCWRC] North Carolina Wildlife Resources Commission. North Carolina Mussel Atlas: [http://www.ncwildlife.org/Wildlife\\_Species\\_Con/WSC\\_Mussel\\_2.htm](http://www.ncwildlife.org/Wildlife_Species_Con/WSC_Mussel_2.htm). (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Appalachian elktoe Fact Sheet. <http://www.fws.gov/asheville/pdfs/AppalachianElktoe.pdf>. (Accessed: October 20, 2010).

### **Carolina heelsplitter**

USFWS Recommended Survey Window: year round

Habitat Description: The Carolina heelsplitter was historically known from several locations within the Catawba and Pee Dee River systems in North Carolina and the Pee Dee and Savannah River systems, and possibly the Saluda River system in South Carolina. In North Carolina, the species is now known only from a handful of streams in the Pee Dee and Catawba River systems. The species exists in very low abundances, usually within 6 feet of shorelines, throughout its known range. The general habitat requirements for the Carolina heelsplitter are shaded areas in large rivers to small streams, often burrowed into clay banks between the root systems of trees, or in runs along steep banks with moderate current. The more recent habitat where the Carolina heelsplitter has been found is in sections of streams containing bedrock with perpendicular crevices filled with sand and gravel, and with wide riparian buffers.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed October 20, 2010)

[NCWRC] North Carolina Wildlife Resources Commission. North Carolina Mussel Atlas: [http://www.ncwildlife.org/wildlife\\_species\\_con/WSC\\_Mussel\\_4.htm](http://www.ncwildlife.org/wildlife_species_con/WSC_Mussel_4.htm). (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Carolina heelsplitter in North Carolina. <http://www.fws.gov/nc-es/mussel/carolheel.html>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Carolina heelsplitter fact sheet. [http://www.fws.gov/asheville/htmls/listedspecies/Carolina\\_heelsplitter.html](http://www.fws.gov/asheville/htmls/listedspecies/Carolina_heelsplitter.html). (Accessed: October 20, 2010).

### **Cumberland bean**

USFWS Recommended Survey Window: year round

Habitat Description: Historically, the Cumberland bean was known from ten river systems in the Cumberland and Tennessee River basins in Alabama, Georgia, Kentucky, Tennessee, and Virginia. The Cumberland bean currently survives in only three of those systems. A relatively strong population exists in a short reach of the Hiwassee River downstream of the North Carolina/Tennessee State line in Polk County, Tennessee. Although no specimens have been collected in North Carolina, it is likely that the species occurs in small numbers in the North Carolina portion of the in the Hiwassee River, where the habitat appears suitable below the Appalachia Dam, Cherokee County. The Cumberland bean typically inhabits medium-sized streams to small rivers 15-65 feet in width. The species is found in silt-free sand, gravel, and cobble substrates in waters with moderate to fast currents and depths less 3 feet. It frequently occurs in the transition zone between gravel and sand substrates.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NCWRC] North Carolina Wildlife Resources Commission. North Carolina Mussel Atlas: [http://www.ncwildlife.org/wildlife\\_species\\_con/WSC\\_Mussel\\_36.htm](http://www.ncwildlife.org/wildlife_species_con/WSC_Mussel_36.htm). (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Cumberland Bean Pearlymussel (*Villosa trabalis*): [http://ecos.fws.gov/docs/life\\_histories/F000.html](http://ecos.fws.gov/docs/life_histories/F000.html). (Accessed: October 20, 2010).

### **Dwarf wedgemussel**

USFWS Recommended Survey Window: year round

Habitat Description: In North Carolina, the dwarf wedgemussel is known from the Neuse and Tar River drainages. The mussel inhabits creek and river areas with a slow to moderate current and sand, gravel, or firm silt bottoms. Water in these areas must be well oxygenated. Stream banks in these areas are generally stable with extensive root systems holding soils in place.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NCWRC] North Carolina Wildlife Resources Commission. North Carolina Mussel Atlas: [http://www.ncwildlife.org/wildlife\\_species\\_con/WSC\\_Mussel\\_1.htm](http://www.ncwildlife.org/wildlife_species_con/WSC_Mussel_1.htm). (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Dwarf wedgemussel fact sheet. [http://www.fws.gov/asheville/htmls/listedspecies/dwarf\\_wedgemussel.html](http://www.fws.gov/asheville/htmls/listedspecies/dwarf_wedgemussel.html). (Accessed: October 20, 2010).

### **James spinymussel**

USFWS Recommended Survey Window: year round; April-June (optimal)

Habitat Description: The James spinymussel was once found throughout the main stem of the James River and all of its major tributaries upstream of Richmond VA. The species has experienced a precipitous decline over the past two decades and now exists only in small, headwater tributaries of the upper James River basin in Virginia and West Virginia and the upper Roanoke River drainage of Virginia and North Carolina. The James spinymussel is found in waters with slow to moderate current and relatively hard water on sand and mixed sand-gravel substrates that are free from silt.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. James spinymussel in NC: <http://www.fws.gov/nc-es/mussel/jamesspiny.html>. (Accessed: October 20, 2010).

### **Littlewing pearly mussel**

USFWS Recommended Survey Window: year round

Habitat Description: In North Carolina, the littlewing pearly mussel is known from the Little Tennessee River watershed. It inhabits small to medium-sized streams with low turbidity, cool water, and a high to moderate gradient. This mussel can be found buried in gravel or beneath boulders and slabrock, or lying on top of the substratum in riffles. It can also be found partly buried or on the surface of the substratum in the transition zone between long pools and riffles. It has been suggested that the best times to find this mussel are in late spring and in the late fall, when they are on top or partly buried in the substratum during spawning.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NCWRC] North Carolina Wildlife Resources Commission. North Carolina Mussel Atlas: [http://www.ncwildlife.org/wildlife\\_species\\_con/WSC\\_Mussel\\_5.htm](http://www.ncwildlife.org/wildlife_species_con/WSC_Mussel_5.htm). (Accessed: October 20, 2010).

### **Tan riffleshell**

USFWS Recommended Survey Window: year round

Habitat Description: Historic occurrences of the Tan riffleshell are known from the French Broad and Hiwassee Rivers in North Carolina. Currently, the only known viable population of this species is located in Tazwell County, Virginia. Individuals are typically found in headwaters, riffles, and shoals in sand and gravel substrates.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Tan riffleshell (*Epioblasma florentina walkei*). [http://ecos.fws.gov/docs/life\\_histories/F010.html](http://ecos.fws.gov/docs/life_histories/F010.html). (Accessed: February 14, 2008).

### **Tar River spinymussel**

USFWS Recommended Survey Window: year round

Habitat Description: The Tar spinymussel is endemic to the Tar and Neuse River drainage basins in North Carolina. This mussel requires a stream with fast flowing, well-oxygenated, circumneutral pH water. The bottom should be composed of unconsolidated gravel and coarse sand. The water needs to be relatively silt-free, and stream banks should be stable, typically with many roots from adjacent riparian trees and shrubs.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NCWRC] North Carolina Wildlife Resources Commission. North Carolina Mussel Atlas: [http://www.ncwildlife.org/wildlife\\_species\\_con/WSC\\_Mussel\\_3.htm](http://www.ncwildlife.org/wildlife_species_con/WSC_Mussel_3.htm). (Accessed: February 14, 2008).

[NCNHP] North Carolina Natural Heritage Program. Tar Spinymussel: <http://www.ncnhp.org/Images/65.pdf>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Tar spinymussel fact sheet. [http://www.fws.gov/asheville/htmls/listedspecies/Tar\\_spinymussel.html](http://www.fws.gov/asheville/htmls/listedspecies/Tar_spinymussel.html). (Accessed: October 20, 2010).

## **REPTILES**

### **American alligator**

USFWS Recommended Survey Window: year round (only warm days in winter)

Habitat Description: In North Carolina, alligators have been recorded in nearly every coastal county, and many inland counties to the fall line. The alligator is found rivers, streams, canals, lakes, swamps, and coastal marshes. Adult animals are highly tolerant of salt water, but the young are apparently more sensitive, with salinities greater than 5 parts per thousand considered harmful. The American alligator remains on the protected species list due to its similarity in appearance to the Endangered American crocodile.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. American alligator (*Alligator mississippiensis*) species profile.

<http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=C000>.

(Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. American alligators in North Carolina. <http://www.fws.gov/nc-es/reptile/alligat.html>. (Accessed: October 20, 2010).

### **Bog turtle**

USFWS Recommended Survey Window: April 1 – October 1 (visual surveys); April 1- June 15 (optimal for breeding/nesting); May 1-June 30 (trapping surveys)

Habitat Description: Bog turtle habitat consists of open, groundwater supplied (spring fed), graminoid dominated wetlands along riparian corridors or on seepage slopes. These habitats are designated as mountain bogs by the North Carolina Natural Heritage Program, but they are technically poor, moderate, or rich fens that may be associated with wet pastures and old drainage ditches that have saturated muddy substrates with open canopies. These habitats, found between 700 and 4,500 feet above mean sea level in the western Piedmont and mountain counties of North Carolina, often support sphagnum moss and may contain carnivorous plants. Soil types (poorly drained silt loams) from which bog turtle habitats have been found include Arkaqua, Chewacla, Dellwood, Codorus complex, Hatboro, Nikwasi, Potomac – Iotla complex, Reddies, Rosman, Tate – Cullowhee complex, Toxaway, Tuckasegee – Cullasaja complex, Tusquitee, Watauga, and Wehadkee.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NCWRC] North Carolina Wildlife Resources Commission. Bog Turtle Fact Sheet. 2006. [http://www.ncwildlife.org/pg07\\_wildlifespeciescon/nongame\\_bogturtle\\_lores.pdf](http://www.ncwildlife.org/pg07_wildlifespeciescon/nongame_bogturtle_lores.pdf). (Accessed: February 22, 2008).

[USFWS] United States Fish and Wildlife Service. Bog Turtles in North Carolina. <http://www.fws.gov/nc-es/reptile/bogtur.html>. (Accessed: February 22, 2008).

### **Green sea turtle**

USFWS/NMFS Recommended Survey Window: April-August

Habitat Description: The green sea turtle is found in temperate and tropical oceans and

seas. Nesting in North America is limited to small communities on the east coast of Florida requiring beaches with minimal disturbances and a sloping platform for nesting (they do not nest in NC). The green sea turtle can be found in shallow waters. They are attracted to lagoons, reefs, bays, mangrove swamps and inlets where an abundance of marine grasses can be found, as this is the principle food source for the green turtle.

#### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NOAA] National Oceanic and Atmospheric Administration. Fisheries, Office of Protected Resources. Green Turtle (*Chelonia mydas*). <http://www.nmfs.noaa.gov/pr/species/turtles/green.htm>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Green Sea Turtles in North Carolina. <http://www.fws.gov/nc-es/reptile/greensea.html>. (Accessed: October 20, 2010).

#### **Hawksbill turtle**

USFWS/NMFS Recommended Survey Window: April-August

Habitat Description: Hawksbill sea turtles are found in tropical and subtropical oceans. Sightings have been reported on the east coast of the U.S. as far north as Massachusetts, although rarely north of Florida. Sightings have been recorded from a handful of counties in North Carolina, but the turtle is not known to breed here. Adult hawksbills are found in coastal waters, especially around coral reefs, rocky outcrops, shoals, mangrove bays, and estuaries. Juveniles are often seen offshore, in floating mats of seaweed. This species nests on a wide range of beach types and substrates, using both low- and high-energy beaches on islands and mainland sites. The nest is typically placed near or under some vegetation.

#### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NOAA] National Oceanic and Atmospheric Administration. Fisheries, Office of Protected Resources. Hawksbill Turtle (*Eretmochelys imbricata*). <http://www.nmfs.noaa.gov/pr/species/turtles/hawksbill.htm>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Hawksbill Sea Turtles in North Carolina. <http://www.fws.gov/nc-es/reptile/hawksbill.html>. (Accessed: October 20, 2010).

### **Kemp's ridley sea turtle**

USFWS/NMFS Recommended Survey Window: April-August

Habitat Description: Kemp's ridley sea turtle is the smallest of the sea turtles that visit North Carolina's coast, and has been sighted in most coastal counties. While the majority of this sea turtle's nesting occurs in Mexico, the species is known to nest on North Carolina beaches infrequently. Sightings of the species exist for most coastal counties. Kemp's ridley sea turtle can lay eggs as many as three times during the April to June breeding season. Kemp's ridley sea turtles prefer beach sections that are backed up by extensive swamps or large bodies of open water having seasonal narrow ocean connections and a well defined elevated dune area. The species prefers neritic areas with sandy or muddy bottoms.

Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NCNHP] North Carolina Natural Heritage Program. *Lepidochelys kempii* - Atlantic Ridley. <http://149.168.1.196/nhp/makeMap.php?sciName=Lepidochelys%20kempii>. (Accessed: October 20, 2010).

[NOAA] National Oceanic and Atmospheric Administration. Fisheries, Office of Protected Resources. Kemp's Ridley Turtle (*Lepidochelys kempii*). <http://www.nmfs.noaa.gov/pr/species/turtles/kempstridley.htm>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Kemp's Ridley Sea Turtles in North Carolina. <http://www.fws.gov/nc-es/reptile/ridley.html>. (Accessed: October 20, 2010).

### **Leatherback sea turtle**

USFWS/NMFS Recommended Survey Window: April-August

Habitat Description: Leatherbacks are distributed world-wide in tropical waters of the Atlantic, Pacific, and Indian oceans. They are generally open ocean species, and may be common off the North Carolina coast during certain times of the year. However, in northern waters leatherbacks are reported to enter into bays, estuaries, and other inland bodies of water. Major nesting areas occur mainly in tropical regions. In the United States, primary nesting areas are in Florida, however nests are known from Georgia, South Carolina, and North Carolina as well. Nesting occurs from April to August. Leatherbacks need sandy beaches backed with vegetation in the proximity of deep water and generally with rough seas. Beaches with a relatively steep slope are usually preferred.

## Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NOAA] National Oceanic and Atmospheric Administration. Fisheries, Office of Protected Resources. Leatherback Turtle (*Dermochelys coriacea*). <http://www.nmfs.noaa.gov/pr/species/turtles/leatherback.htm>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Leatherback Sea Turtles in North Carolina. <http://www.fws.gov/nc-es/reptile/leather.html>. (Accessed: October 20, 2010).

## **Loggerhead turtle**

USFWS/NMFS Recommended Survey Window: April-August

Habitat Description: The loggerhead is widely distributed within its range, and is found in three distinct habitats during their lives. These turtles may be found hundreds of miles out in the open ocean, in neritic areas, or on coastal beaches. In North Carolina, this species has been observed in every coastal county. Loggerheads occasionally nest on North Carolina beaches, and are the most common of all the sea turtles that visit the North Carolina coast. They nest nocturnally, at two to three year intervals, between May and September, on isolated beaches that are characterized by fine-grained sediments. In near shore areas, loggerheads have been observed in bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky places, and shipwrecks are often used as foraging areas.

## Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[NOAA] National Oceanic and Atmospheric Administration. Fisheries, Office of Protected Resources. Loggerhead Turtle (*Caretta caretta*). <http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Loggerhead Sea Turtles in North Carolina. <http://www.fws.gov/nc-es/reptile/logger.html>. (Accessed: October 20, 2010).

## **SNAIL**

### **Noonday globe**

USFWS Recommended Survey Window: April-September (or prior to first fall frost);  
April-May (optimal)

Habitat Description: The noonday globe is restricted to a small area within the Nantahala gorge in western North Carolina, where it is found in association with high, steep, wet, calcareous cliffs. (Calcium is vital to snails because it is a major component of their shells.) The forest in this area is mature, with many large trees and a diverse plant community, and a forest floor with a thick, rich humus layer. The biology of this species is largely unknown. During warm months, these snails can be found on wet surface vegetation. In dryer times, the snails often reside under leaf litter. They are active both day and night. It is thought that noonday snails feed on vegetation and fungal mycelia.

### Biological Conclusion:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: October 20, 2010).

[USFWS] United States Fish and Wildlife Service. Noonday Globe in North Carolina. <http://www.fws.gov/nc-es/snail/noonglobe.html>. (Accessed: October 20, 2010).